

## A NEW SPECIES OF *PAUROPUS* FROM VICTORIA

By *O. W. Tiegs, D.Sc.*,

*Associate-Professor of Zoology, University of Melbourne*

Although Pauropoda are of widespread occurrence in Australia, they have not attracted much attention from systematists, probably owing to their small size and obscure habitat. Nearly thirty years ago Harrison (2) described five species, including a member of the remarkable genus *Eurypauropus*, from the neighbourhood of Sydney; since then the list of Australian species has not, as far as I am aware, been added to.

The species which is described in the present paper is one that I have obtained in large numbers in the damp mountainous forest country at Belgrave in Victoria, and I am using it at present as material for the study of the embryology of these peculiar arthropods. As it seems to be distinct from any other form hitherto recorded, a taxonomic description is needed.

In the following account I have fairly closely followed the method of description worked out by Hansen (1); for when types are not accessible, comparison with his species can be made only on the basis of those characters to which he specifically refers. The nomenclature adopted is also based on that of Hansen.

Class **PAUROPODA** Lubbock, 1868

Order **HETEROGNATHA** Saussure et Humbert, 1872

Family **PAUROPODIDAE** Lubbock, 1868

Genus **PAUROPUS** Lubbock, 1868

*Pauropus silvaticus* sp. nov

*Size.* The largest specimens encountered measured 1.2 mm. in length, the smallest with full number of legs, about 0.86 mm.; the average length based on a measurement of twelve individuals, is 0.97 mm. Average breadth about 0.23 mm.

*Head* (fig. 1). The distance between the "ocular areas" on the dorsal surface of the head is about the same as the length of the areas.

The head is itself completely free from pubescence; its setae are, however, all covered with a very delicate, just perceptible pubescence.

These setae are, as usual, disposed in four transverse rows: (i) An anterior, mainly pre-antennal, row of setae, of which one lies unpaired in the median line. Five of these setae are clavate, measuring 0.2 mm. in length; but the two most lateral setae are delicate and cylindrical, and are not longer than the clavate setae. (ii) The second row is post-antennal, and comprises eight setae, of which six are clavate and are similar to those of the first row, while the two most lateral setae are cylindrical, and do not exceed the clavate setae in length. This row ends just in front of the inner angles of the "ocular areas." (iii) The third row consists of six widely spaced setae, of which four are clavate, while the two most lateral,

arising from the sides of the head, are long and cylindrical, measuring about  $\cdot 04$  mm. in length. (iv) In the fourth row there are eight widely spaced setae, of which the middle pair is short and clavate, measuring only about  $\cdot 014$  mm. in length, while the three pairs to the sides of these are cylindrical, the inner two pairs measuring about  $\cdot 036$  mm. in length, the most lateral pair about two-thirds of this.

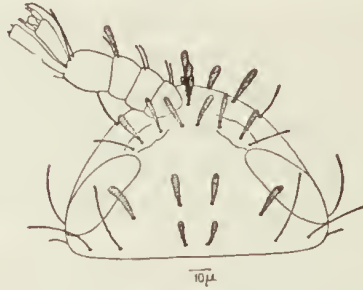


FIG. 1.

Head; dorsal view; right antenna removed to show the setae beneath it.

In addition to these setae, there are present three unpaired clavate setae, which are in a line with the median seta of the first transverse row; one of these, at the very tip of the head, is minute; the other two, between the bases of the antennae, are only a little shorter than the clavate setae of the first row.

*Antennae* (fig. 2). The distal segment of the antenna is much the longest, and is nearly twice the length of the third segment. There are two minute setae on

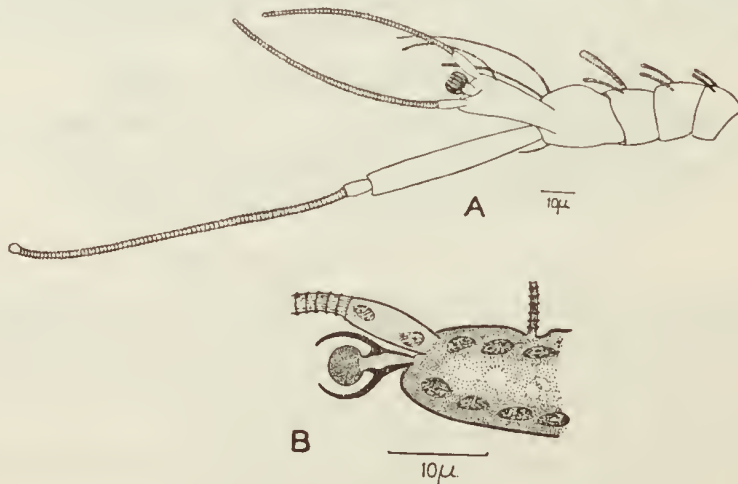


FIG. 2

Antenna.

A. Right antenna, ventral view.

B. Distal end of lower ramus, showing the globulus (from a microtome section).

each of the first three segments, just perceptibly clavate, except one on the third segment, which is markedly clavate and larger. On the fourth segment the two setae are long, slender and cylindrical; one is almost as long as the peduncle, the other about three-quarters its length. The upper ramus of the antenna is as long as the peduncle, and is very slender, its length being about eight times its breadth;

it is about half the length of its flagellum. The lower ramus of the antenna measures about five-eighths of the length of the upper ramus, and is about three times as long as broad; its anterior flagellum is only very slightly shorter than the posterior, and measures about  $2\frac{1}{2}$  times the length of the lower ramus. The globulus (fig. 2B) is comparatively small, and is about twice the width of its very short stalk.

*Trunk.* This is of medium build, being neither exceptionally slender, nor, compared with other species, markedly robust. It gradually widens up to the fifth segment, and beyond the seventh tapers more sharply.

The dorsal shields are approximately rounded, the first being about the breadth of the head. They are completely devoid of pubescence. The setae are cylindrical with blunt ends; and though some are slightly swollen at the tips, they are never markedly clavate. The six setae on the penultimate segment are all rather enlarged, and measure about one-third the breadth of the segment (fig. 3A).

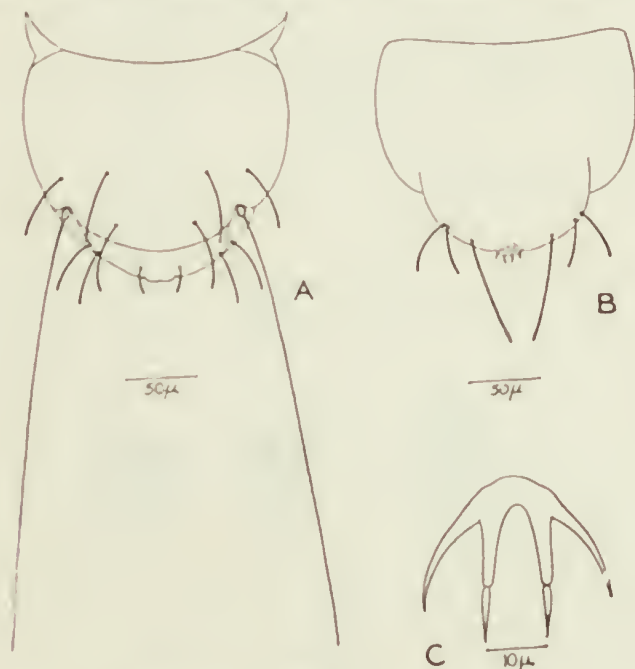


FIG. 3.

Posterior end of abdomen, showing setae and "anal plate."

A. Dorsal view (Tergal setae only shown).

B. Ventral view (Sternal setae only shown). Part of "anal plate" protruding.

C. "Anal plate."

The fifth pair of tactile setae (trichobothria) measures about 0.3 mm. in length, and is about twice as long as the breadth of the segment (fig. 3A); along its distal two-thirds is a very delicate close pubescence, but the proximal third is naked. The fourth tactile seta is a little less than four-fifths the length of the fifth; like the fifth it is faintly pubescent, the basal end alone being bare. The third seta is rather more than half the length of the fifth, and about three-quarters the breadth of its segment; it is faintly pubescent to within one-quarter its length from its base. The second and first setae are about half the length of the fifth, only the distal half being faintly pubescent.

*Anal segment* (fig. 3). At its posterior tip the tergum of the anal segment grows out as an inconspicuous thin protuberance above the "anal plate," but is not as

prominent as the protuberances that have been figured here for some species of *Pauropus*. The setae are all cylindrical, ending bluntly. The lateral and intermediate tergal setae are about equal in length, and about twice the length of the submedian setae. The distance between the two submedian setae is about the same as the distance between the submedian and intermediate setae and is about three times the distance between the intermediate and lateral setae.

Of the sternal setae the posterior are much the largest, and are about twice the length of the anterior tergal setae; the lateral sternal setae measure about the same length as the lateral tergal setae (fig. 3B).

The "anal plate" (fig. 3C) measures about .025 mm. in length, and is furnished with four processes lying in the same plane. The median cleft, which extends

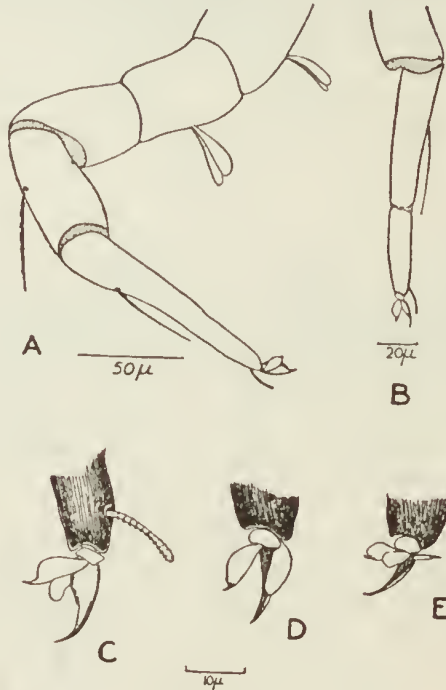


FIG. 4.  
Leg.

- A. Posterior leg.  
 B. Distal end of same, from a caustic potash preparation, chitin stained with eosin. Note incipient division of distal leg segment, indicated by constriction and thinning out of chitin (dotted).  
 C. Distal end of tarsus of left hind leg (external aspect).  
 D. The same (ventral view); note absence of posterior claw (posterior end to right).  
 E. Similar view of tip of tarsus of left sixth leg.

almost to the base of the plate, has a rounded ending. The two diverging outer processes curve inwards a little, and taper each to a point. The inner processes are rather thicker at the base; their distal end tapers into a narrow separately articulated and apparently very faintly pubescent segment.

The "styles" are thinner than the outer processes of the "anal plate," and are a little shorter than the submedian setae.

*Legs* (fig. 4). Like the dorsal shields these are completely free from pubescence. They increase considerably in length posteriorly, the last leg measuring about 0.3 mm. in length. The femur of the last leg (fig. 4A) is a little longer than the

trochanter, about half as long again as thick, and a little shorter than the tibia. The tibia is only a little longer than its seta. In the terminal segment of the last leg there is, as usual, no demarcation of a metatarsus from a tarsus. But a little beyond its middle there is recognizable, with various degrees of clearness in different individuals, a partial constriction with thinned-out chitin (fig. 4B). This constriction is also perceptible in some of the more anterior legs, but not so clearly as in the last. This incipient division of the tarsus is not confined to the present species. On this point Hansen (1) writes: "In some large species of *Pauropus* the tarsus of the ninth pair presents a faint indication of a division into two joints, but this spurious articulation or thin-skinned place is always situated outside the middle of the tarsus and has nothing to do with the sharp division into metatarsus and tarsus existing in the eighth and other pairs, in which the metatarsus is always much shorter than the tarsus."

The seta of the tibia of the last leg is tapering and pubescent. A similar but shorter seta arises from near the upper end of the tarsus. At the lower end of the tarsus is a very short cylindrical faintly pubescent seta, about as long as the claw. The coxa and trochanter bear each a single biramous seta; in the more anterior legs the corresponding setae are uniramous.

The middle claw of all the legs is well developed; the posterior claw is small, and on the last pair of legs is not merely of diminished size, as in most species, but completely absent (cf. figs. 4C, D, E).

*Locality.* Belgrave, Victoria.

Type in National Museum, Melbourne.

Of the described species of *Pauropus* Harrison's *P. australis* seems to approach the nearest to the new species above described. In size both are about the same, though *P. australis* seems to be much more slender. Particularly striking is the general resemblance of the hind legs with its reduced number of claws,<sup>1</sup> the anal plate and the posterior setae. The head and antennae of *P. australis* have not been described with sufficient attention to those minute points of detail that are needed for the differentiation of species in *Pauropus*. On the principal points of difference Harrison is quite definite. In *P. australis* "the cuticle shows a fairly long pubescence on the last shield, anal segment, and posterior legs; a slight pubescence on the fifth shield; and is smooth in front of that"; in *P. silvaticus* the dorsal shields and the legs are completely free from pubescence. In *P. australis* Harrison found the first tactile seta (trichobothrium) to be "very coarsely plumose distally"; in *P. silvaticus* the seta is uniformly faintly pubescent along its distal half.

*Habits.*—The animals may be found under stones, fallen timber, or amongst the thick deposit of fallen leaves on the forest floor. They also enter rotting tree-trunks, half-decayed logs of tree-fern (*Alsophila*, *Dicksonia*) being particularly favoured. I have obtained several hundred out of a single such log. They select a damp environment, dry or wet surroundings being both avoided. They are light-shy creatures, and quickly run for cover when disturbed.

Oviposition takes place in the early and middle summer months, the eggs being scattered about singly in the decaying vegetation within which the animals live. The eggs are white and spherical,

1. Harrison's statement that it is the middle claw that is absent in the hind leg is probably an error; it is the normally diminutive posterior claw that becomes reduced in the ninth leg in all species of *Pauropus* (Hansen, 1901), and has completely vanished in *P. silvaticus*.

extremely minute, measuring seldom more than 0.11 mm. in diameter. All the larval stages, comprising animals with 3, 5, 6 and 8 pairs of legs can be found in abundance during the summer, in places where the adults are prevalent.

There is no evidence that the animals are predaceous, as some writers on *Pauropus* have inferred from the activity of their movements; nor do they seem to ingest solid vegetable material, for this is not recognizable in the distended intestine. The latter, indeed, contains nothing but fluid material. It seems that *Pauropus* subsists upon organic matter dissolved in the juices of the rotting vegetation within which it lives.

Despite the agility of their movements the animals are much preyed upon by the more slowly moving pedipalps and predaceous mites that form part of the associated microfauna; and I have occasionally seen even adult animals that have fallen victim to their attack.

Unlike one of the species described by Harrison (*P. amicus*), it cannot be said of *P. silvaticus* that it is markedly sociable in its habits. In captivity, it is true, the animals sometimes congregate under fragments of leaf or wood in the breeding receptacles, but I have not encountered this under natural conditions. Nor do the animals exhibit the remarkable maternal instinct of guarding their eggs, as observed by Harrison in *P. amicus*; indeed, the eggs are not laid in clumps, but, as already stated, are scattered about singly and at random amongst the rotting vegetation in which they live.

#### REFERENCES

1. Hansen, H. J. On the genera and species of the order Pauropoda. Vidensk. Meddel. d. nat. hist. Forening, Copenhagen, 1901, p. 323.
2. Harrison, L. On some Pauropoda from New South Wales. Proc. Linn. Soc. N.S.W., 1914, xxxix, p. 615.
3. Lubbock, J. On *Pauropus*, a new type of Centipede. Trans. Linn. Soc. London, 1868, xxvi, p. 181.